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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/267,968	03/12/1999	CHRISTOPHER R. DANCE	R/98021	7804

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EXAMINER	
FAULK, DEVONA E	

ART UNIT	PAPER NUMBER
2644	8

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/267,968	DANCE ET AL.	
	Examiner	Art Unit	
	Devona E. Faulk	2644	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE ____ MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 March 1999*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-49* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,7,8,22,35,36,40,43,44,47 and 48* is/are rejected.

7)☒ Claim(s) *3-6,9-21,23-34,37-39,41,42,45,46 and 49* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *2,4,7*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. **Claims 1 and 35** are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuruoglu ("Impulsive Noise Elimination Using Polynomial Iteratively Reweighted Least Squares") in view of applicant's admitted prior art (Page 2, line 20-page 3, line 9).

3. Regarding **claim 1**, Kuruoglu discloses a non-linear filtering technique for the elimination of impulsive noise modeled with a Symmetric alpha-stable distribution comprising using Volterra filters to estimate the clean data from corrupted data which reads on "computing with a prediction filter an estimate of the data components of the sampled signals using the estimated parameters of the alpha-stable distribution" also on "estimating parameters of an alpha-stable distribution to model impulse noise that corrupts data signals input into a transmission medium of the signal processing system". Kuruoglu teaches that this is related to the field of signal processing. So although he does not specifically teach of a signal processing system, it is obvious that in order for this technique to be used in "real-world" situations, that a signal processing system would have to be present. Although, Kuruoglu does not specifically teach of estimating the parameters of an alpha-stable distribution, it is obvious that the parameters have to be estimated. By virtue of what the alpha-stable distribution, a distribution to

which there is no explicit expressions for the probability distribution function (pdf) (pg. 347, section 1.1). It is well known in the art that in signal processing systems, sampling takes place and that some type of memory device is present. It is also known in the art, as stated in the applicant's background, that a sampled signal has a noise and a data component (page 2, line 20-page 3, line 2). Thus Kuruoglu's obviously reads on "sampling signals from the transmission medium; said sampling step storing the sampled signals in a memory; the sampled signals having a noise component and a data component". The method is obviously present. Thus it would have been obvious to one of ordinary skill in the art at the time of the invention to use Kuruoglu's technique for the benefit of being able model situations where the noise does not fit the Gaussian model.

4. Regarding **claim 35**, Kuruoglu discloses a non-linear filtering technique for the elimination of impulsive noise modeled with a Symmetric alpha-stable distribution comprising using Volterra filters to estimate the clean data from corrupted data which reads on "a signal estimation module for computing an estimate of the data component of the sampled signals output from the transmission medium using the estimated parameters of the alpha-stable distribution" and also on "a parameter estimation module for estimating parameters of an alpha-stable distribution; the alpha-stable distribution modeling impulse noise that corrupts data signals input into a transmission medium of the signal processing system". Kuruoglu teaches that this is related to the field of signal processing. So although he does not specifically teach of a signal processing system, it is obvious that in order for this technique to be used in "real-world" situations, that a signal processing system would have to be present. Although, Kuruoglu does not specifically teach of estimator, one is obviously present. By virtue of what the alpha-stable

distribution, a distribution to which there is no explicit expressions for the probability distribution function (pdf) (pg. 347, section 1.1), an estimator has to be present. It is well known in the art that in signal processing systems, sampling takes place and that some type of memory device is present. It is also known in the art, as stated in the applicant's background, that a sampled signal has a noise and a data component (page 2, line 20-page 3, line 2). Thus it would have been obvious to one of ordinary skill in the art at the time of the invention to use Kuruoglu's technique for the benefit of having a signal processing system that could remove noise that does not fit the Gaussian model.

5. **Claim 2** is rejected under 35 U.S.C. 103(a) as being unpatentable over Kuruoglu ("Impulsive Noise Elimination Using Polynomial Iteratively Reweighted Least Squares") in view of applicant's admitted prior art (Page 2, line 20-page 3, line 9) in further view of Wu (U.S. Patent 6,072,782)

Claim 2 claims the method of claim 1wherein said sampling step is performed from digital subscriber line (DSL). Wu teaches of samples from a DSL line (see claim 1, Figure 1). Thus it would have been obvious to one of ordinary skill in the art at the time of the invention to have the sampling performed from a DSL for the benefit of reducing computational time.

6. **Claims 7, 8, 22,36,40,43 and 44** are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuruoglu ("Impulsive Noise Elimination Using Polynomial Iteratively Reweighted Least Squares") in view of applicant's admitted prior art (Page 2, line 20-page 3, line 9) in further view of Ma ("Parameter Estimation and Blind Channel Identification in Impulsive Signal Environments", 1995).

Claim 7 clams the method of claim 1 further comprising the steps of estimating a characteristic exponent of the alpha-stable distribution that models impulse noise corrupting the sampled signal and optimizing model coefficients of the prediction filter using the estimated characteristic exponent of the alpha-stable distribution. The characteristic exponent of the alpha-stable distribution is alpha. Ma discloses estimation of characteristic exponent α and dispersion γ (page 2884, column 2). Thus it would have been obvious to one of ordinary skill in the art at the time of the invention to estimated the characteristic exponent as shown by Ma for the benefit of blind channel identification in impulsive signal environments.

Claim 8 claims the method of claim 7, wherein said optimizing step minimizes a p^{th}-power error criterion to optimize the model coefficients of the prediction filter. Kuruoglu further teaches in the article of using the minimum dispersion criterion, which minimizes the p^{th} order moment (page 348, column 2). All elements of claim 8 are comprehended by claim 1. Thus claim 8 is rejected for reasons given above in claim 1.

Claim 22 claims the method of claim 1, further comprising the step of computing a moment of the alpha-stable distribution. Ma teaches of estimating the characteristic exponent α and dispersion γ by computing lower-order moments of the alpha-stable distribution (page 2884, column 2). Thus it would have been obvious to one of ordinary skill in the art at the time of invention to use Ma's method of estimation by calculating the moments for the benefit of providing an alternative estimation method.

Claim 36 clams apparatus of claim 35 wherein, the signal estimation module further comprises a prediction filter for estimating, using model coefficients, the data components of the sampled signals output from the transmission medium; the estimated data components

corresponding to an estimation of the data signals input into the transmission medium and a coefficient optimization module for optimizing the model coefficients of the prediction filter using one of the estimated parameters of the alpha-stable distribution received from said parameter estimation module. Ma discloses estimation of characteristic exponent α and dispersion γ (page 2884, column 2). Thus it would have been obvious to one of ordinary skill in the art at the time of the invention to estimated the characteristic exponent as shown by Ma for the benefit of blind channel identification in impulsive signal environments.

Claim 40 claims the apparatus of claim 36, wherein said parameter estimation module further comprises means for computing moments of the alpha-stable distribution and means for estimating the parameters of the alpha-stable distribution with the computed moments. Ma discloses an estimation method including computing moments and estimating the parameters as claimed (pgs. 2884-2887, particularly page 2885 column 1). Thus it would have been obvious to one of ordinary skill in the art at the time of the invention to use Ma's method of estimation for the benefit of having an alternative method of estimating parameters for the alpha-stable distribution.

Claim 43 claims the apparatus of claim 36, wherein said parameter estimation module adaptively estimates the parameters of the alpha-stable distribution. Ma further teaches of an iterative parameter estimation method (page 2887, column 2), which reads on the claimed matter. Thus it would have been obvious to one of ordinary skill in the art at the time of the invention to use Ma's iterative estimation method for the benefit of memory efficiency.

Claim 44 claims the apparatus of claim 36, wherein said coefficient optimization module uses the parameters of the alpha-stable distribution to specify a minimum dispersion error

criterion for determining the model coefficients of said prediction filter. Kuruoglu further teaches in the article of using the minimum dispersion criterion, which minimizes the p^{th} order moment (page 348, column 2). All elements of claim 44 are comprehended by claim 36. Thus claim 44 is rejected for reasons given above in claim 36.

7. **Claim 47** is rejected under 35 U.S.C. 103(a) as being unpatentable over Kuruoglu ("Impulsive Noise Elimination Using Polynomial Iteratively Reweighted Least Squares") in view of applicant's admitted prior art (Page 2, line 20-page 3, line 9) in further view of Wu (U.S. Patent 6,072,782) in further view of Johnson et al. (5,960,036).

Claim 47 claims the apparatus of claim 36, wherein transmission medium into which the data signals are input is a twisted pair. Wu teaches of samples from a DSL line (see claim 1, Figure 1). Johnson discloses a communications system having an Asymmetric Digital Subscriber Line (ASL) with a twisted pair as the transmission medium. Thus it would have been obvious to one of ordinary skill in the art at the time of the invention to use a twisted pair as the transmission medium for the benefit of decreasing crosstalk interference between cables and for the benefit of saving money in that it is the less expensive than coaxial cable and optical fiber.

8. **Claim 48** is rejected under 35 U.S.C. 103(a) as being unpatentable over Kuruoglu ("Impulsive Noise Elimination Using Polynomial Iteratively Reweighted Least Squares") in view of applicant's admitted prior art (Page 2, line 20-page 3, line 9) in further view of Johnson et al. (5,960,036).

Claim 48 claims the apparatus of claim 35 wherein the signal processing system operates in a digital subscriber line (DSL). Johnson discloses a communications system operating in an Asymmetric Digital Subscriber Line (ASL) (Figure 2). Thus it would have been obvious to one

of ordinary skill in the art at the time of the invention to operate in DSL for the benefit of allowing interactive services to be provided without requiring the installation of fiber optic cable.

Claim Objections

9. **Claims 3-6,9-21,23-34,37-39,41,42,45, 46,49** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Devona E. Faulk whose telephone number is 703-305-4359. The examiner can normally be reached on 8 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Forester W. Isen can be reached on 703-305-4386. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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